



# Governing open access: livestock distributions and institutional control in the Karakum Desert of Turkmenistan



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## ABSTRACT

On the edge of the Karakum Desert in Turkmenistan, the distribution of livestock in space and time can with reasonable accuracy be interpreted in terms of the model of the ideal free distribution: The number of livestock supported by desert settlements varies with the level of resources in a settlement; the propensity of herds to migrate seasonally is a density-dependent function of grazing pressure; migratory cycles exploit temporal fluctuations in feed and water quality between regions. Ideal free models are premised on the assumption that resource consumers have unrestricted access to resources. In conventional economic analyses, open or unrestricted access is equivalent to the absence of land tenure. A formal tenure system, involving the state ownership of land and the management of state lands by collective farms, nonetheless operated in the study area, and was referred to by farm managers and by pastoralists when making decisions about herd movement and resource use. The operation of this tenure system was also demonstrated by the restrictions that it imposed on communities with insufficient resource entitlements. In the great majority of cases, however, and in terms of the land use system as a whole, the tenure system facilitated a process of orderly and free distribution of livestock relative to resources. This paper examines the reasons for and functioning of this theoretical oxymoron—a regulated system of open access. The study contributes to a growing body of literature on the non-exclusive nature of pastoral tenure systems in Africa and Asia.

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## 1. Introduction

Economic theories of land tenure are based on a categorical distinction between property – a bounded resource owned by a group or individual who regulates its use – versus open access—the uninhibited appropriation, first-come-first-served, of resources that are not property and have no owners. The property versus non-property dichotomy is theoretically fundamental because it has practical significance for resource management and human welfare. Whereas property systems are recognized to be potentially stable and profitable systems of resource management, open access constitutes an institutional vacuum that is thought to invite resource overexploitation and impoverishment (Gordon, 1954; Ciriacy-Wantrup and Bishop, 1975; Bromley, 1989; Ostrom, 1990, 2009; Eggertsson, 2003):

Resource systems lacking effective rules regarding access and use patterns are 'open-access' resources ... Valuable open-access resources are always subject to overuse and potential destruction (Ostrom, 1994: 1).

Scott Gordon's classic analysis of overfishing explains the logic behind Ostrom's negative assessment of open access. Gordon asks us to imagine a situation in which fishermen are completely free to sail to the fishing ground of their choice. If they are unconstrained, Gordon argues that all fishermen will sail to the best ground and will continue to do so until catch levels there have been reduced to the level of the second best fishing ground. They will then fish the best two grounds until catches have been depressed to match those of the third best ground, at which point they will fish on three grounds, and so on until catches at all grounds have been reduced to the level of the least productive fishing ground that fishermen can afford to exploit:

This is why fishermen are not wealthy, despite the fact that the fishery resources of the sea are the richest and most indestructible available to man. By and large the only fisherman who becomes rich is one who makes a lucky catch or one who par-

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ticipates in a fishery that is put under a form of social control that turns the open resource into property rights (1954: 132).

Despite the hazards of unimpeded access, collective pastoral tenure systems in Asia and Africa frequently straddle the boundary between property and non-property, mixing elements of individual, group or state ownership with open access. Instead of tightly managed entities possessing clear-cut territories, rangeland resource management is often characterized by loosely defined owners incapable or unwilling to limit their own rates of resource use, territories with fuzzy boundaries, and high levels of resource sharing with outsiders (Fernandez-Gimenez, 2002; Moritz et al., 2010; Turner, 1999, 2011; McCarthy et al., 2000). Because they do not conform to the basic 'design principles' that are thought to be an essential element of enduring common property systems (Ostrom, 1990), contemporary pastoral tenure systems are often portrayed as degraded remnants of 'traditional' systems that, once upon a time, did conform to theoretical expectations of what a common property system should look like.

The persistent deviation of current tenure arrangements from the common property model can also be attributed to the ephemeral, geographically dispersed and unpredictable distribution of natural resources in semi-arid rangeland environments. These environmental characteristics are said to militate against the existence of physically compact, clearly demarcated territories possessed by stable social groups (Behnke, 1994; Agrawal, 2003)—attributes that constitute prerequisites for the formation of enduring common property arrangements.

Ecological theory provides a rigorous conceptual framework in which to examine the anomalous characteristics of pastoral tenure arrangements. The model of the ideal free distribution (IFD) or density dependent habitat selection systematically links individual choices to overall population distributions (Fretwell and Lucas, 1970; Sutherland, 1983; Ward et al., 2000). The fundamental idea behind these theories is that resource consumers respond simultaneously and opportunistically both to resource distributions and to the shifting distributions of other consumers. These spatial ecological models predict that the free movement of animals – i.e. open access, but by animals rather than humans – results in the proportion of animals in an area matching the proportion of resources in that area, a process termed input matching. Input matching occurs because the movement of animals into attractive areas will continue until increasing levels of competition between animals removes the original discrepancies in resource abundance. At this point the incentive to move between areas is gone, the rate of resource consumption or intake is uniform for all individuals, and the animal population has achieved a stable or equilibrium distribution (Sutherland, 1983). Input matching and equal resource intake enable landscapes to support larger populations of resource consumers – again of animals – than systems in which access is constrained (Pulliam and Danielson, 1991; Rozenzweig, 1991; Jonzen et al., 2004; Hancock and Milner-Gulland, 2006).

It is clear that theories of ideal free distribution and open access share much in common, despite their separate origins. Both the biological and economic theories address the question of where resource consumers are likely to be located relative to the availability of natural resources and the presence of other consumers. Both assume that individual consumers act as atomized, self-interested utility maximizers, and explain aggregated behaviour as an equilibrium (e.g. in supply and demand or in animal densities) resulting from the feedback of individual choices on future decision-making (Oksanen et al., 1995). Both are 'marginalist' in that they predict changes in behaviour as a result of diminishing return to effort, either by the feeding animal or the economizing human (Charnov, 1976; Thornley et al., 1994). Both view variations in resource distribution and quality as a fundamental driver behind patterns of

resource exploitation, as in Ricardian theories of economic rent or in ecological investigations of resource heterogeneity (Ricardo, 1821; Jonzen et al., 2004; Langvatn and Hanley, 1993; Hancock and Milner-Gulland, 2006). Finally, both theories posit an identical sequence of site occupation, as resource depletion increasingly drives consumers to use less attractive sites (Sutherland, 1983; Gordon, 1954).

In all but name, these biological and economic theories are identical—with the proviso that one commonly refers to wildlife and the other to human behaviour. These similarities make the ultimate differences between the two theories all the more telling. From a biological perspective, free distributions potentially support large, well-adapted consumer populations. For economists, the equivalent of ideal free distribution – open access – arises when economic actors are free to enter an area at will and consume resources until all intrinsic resource rents – the surpluses that could be generated by more productive areas – are dissipated. This process maximizes the number of consumers that can exploit a resource (Brox, 1990) but represents institutional failure since it diminishes economic performance and is environmentally destructive (Bromley, 1989).

The real difference between open access and the ideal free distribution lies, then, not in the outcomes predicted by each theory, which are remarkably similar, but in the different standards that economists and biologists might use to evaluate these outcomes. To the extent that they would even use the term, biologists might judge the "success" of a population of resource consumers in terms of its size. For economists what matters is economic wellbeing, and in order to maximise sustainable resource consumption per consumer, the number of consumers may need to be limited. Whereas biological processes are generally analysed in the context of a natural environment that limits population growth, economic activities take place in an institutional environment that limits consumption.

The study of pastoral land use in post-Soviet Central Asia provides an opportunity to examine the dual impact of biological incentives and institutional control on the density and distribution of resource consumers, and hence to explore the tensions and congruencies between the biological and economic conceptualizations of IFD/open access. Described here is a system of land use regulated and administered by the government of Turkmenistan, in which the state is the legal owner of all natural resources in rangeland areas and roughly half of all livestock, and can, when it so wishes, dictate or radically alter the terms of resource use. There can be little doubt that this system of land use is governed by a clearly defined and enforceable system of property rights. A degree of openness – i.e. a degree of conformity to IFD patterns of resource exploitation – is widespread not because this system is unregulated, but because regulation routinely facilitates and legitimates free patterns of resource use. This openness would appear to be, in varying degrees, a recurrent feature of pastoral tenure systems, irrespective of whether the formal tenure system is private freehold/leasehold (Sayre, 2005; McAllister, 2010), common property (Bollig, 2006; Turner, 1999; Behnke, 1999), or state ownership (Moritz et al., 2010).

This analysis will document a pastoral land use system suspended between two countervailing tendencies—the potential maximization of resource rents (profit) by resource owners if they chose to exercise exclusive control, versus the maximization of overall output as a result of free distribution. Economic theory captures the first of these tendencies; biological considerations explain the second. As living property, domestic livestock are subject to all the normal biological factors that govern ungulate behaviour and to all the economic considerations that govern property ownership. Free-ranging livestock may therefore use natural resources, or be directed to do so by their owners, in ways that combine economic and biological incentives. The recognition of both sets of factors

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